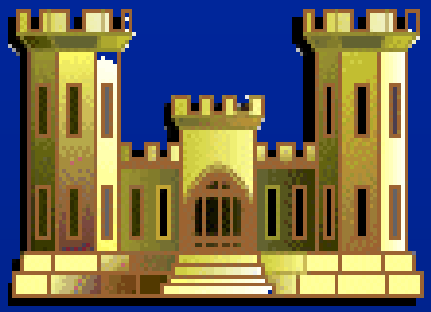
Donaldsonville, LA to the Gulf of Mexico Feasibility Study

LA FOURCHE BASIN LEVEE DISTRICT
STATE OF LOUISIANA
UNION JUSTICE CONFIDENCE
VACHERIE, LA.

LOUISIANA'S ON THE MOVE . . .
DOTD
BUILDS THE WAY

US Army Corps of Engineers®
New Orleans District



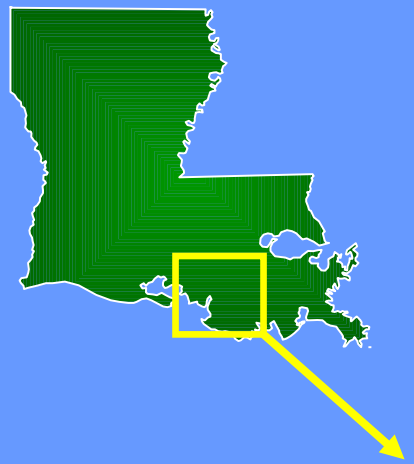
U.S. Army Corps of Engineers
New Orleans District

Existing Conditions Interior Drainage and Hurricane Surge

Donaldsonville, LA to the Gulf of Mexico
Feasibility Study

05/16/06

Donaldsonville, Louisiana to the Gulf of Mexico



Donaldsonville, LA to the Gulf of Mexico

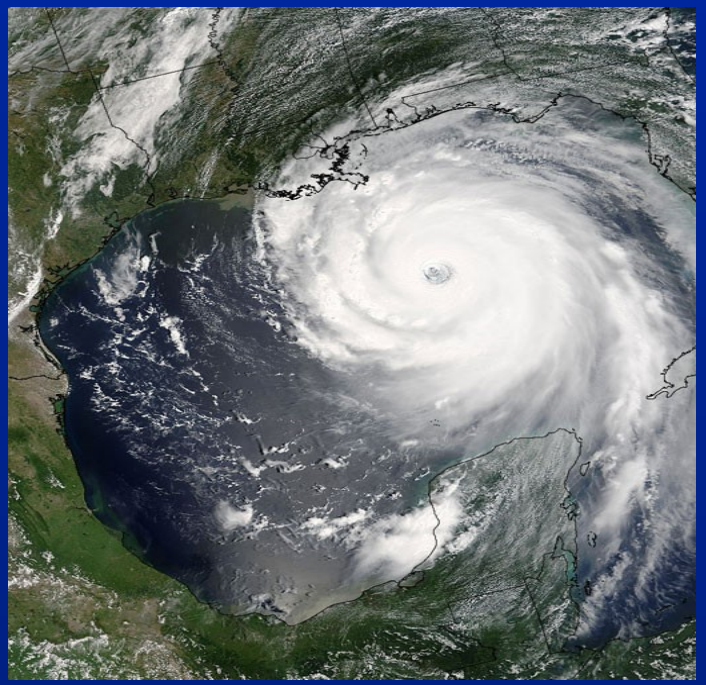
Topics

- Interior Drainage
  - HEC-HMS Schematic
  - HEC-RAS Drainage Area
  - Hurricane Allison Calibration
- Hurricane Surge
  - ADCIRC Modeling
- Typical Existing Conditions
  - Stage Frequency Curves
  - Reach and Stage Data for Economic Analysis
- Future Activities
  - Levee Alternatives
  - Water and Sediment Diversion Structures

Corps of Engineers
New Orleans District

Study Objectives

- **Hurricane Protection**
- **Interior Drainage**
- **Eco-system Restoration**

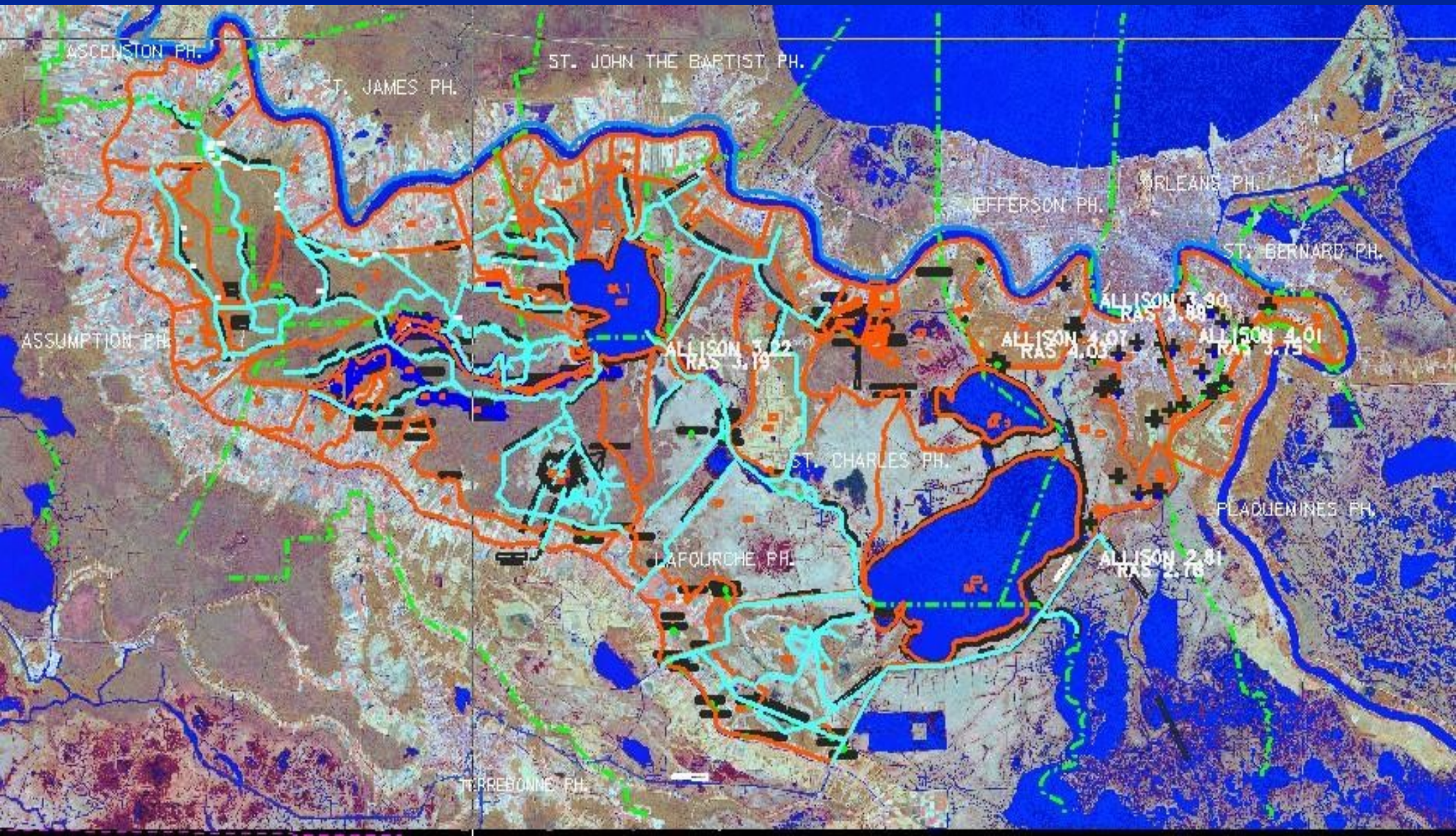


Donaldsonville, LA to the Gulf of Mexico

Interior Drainage

- HEC – HMS and HEC –RAS Modeling
- Interior Hydraulic Model of Existing Conditions
  - Flows in bayous
  - Identify flow obstructions in current system
  - Existing pump stations
  - Need for additional pump stations
  - Effects of additional freshwater diversions
- Analyze Future Conditions

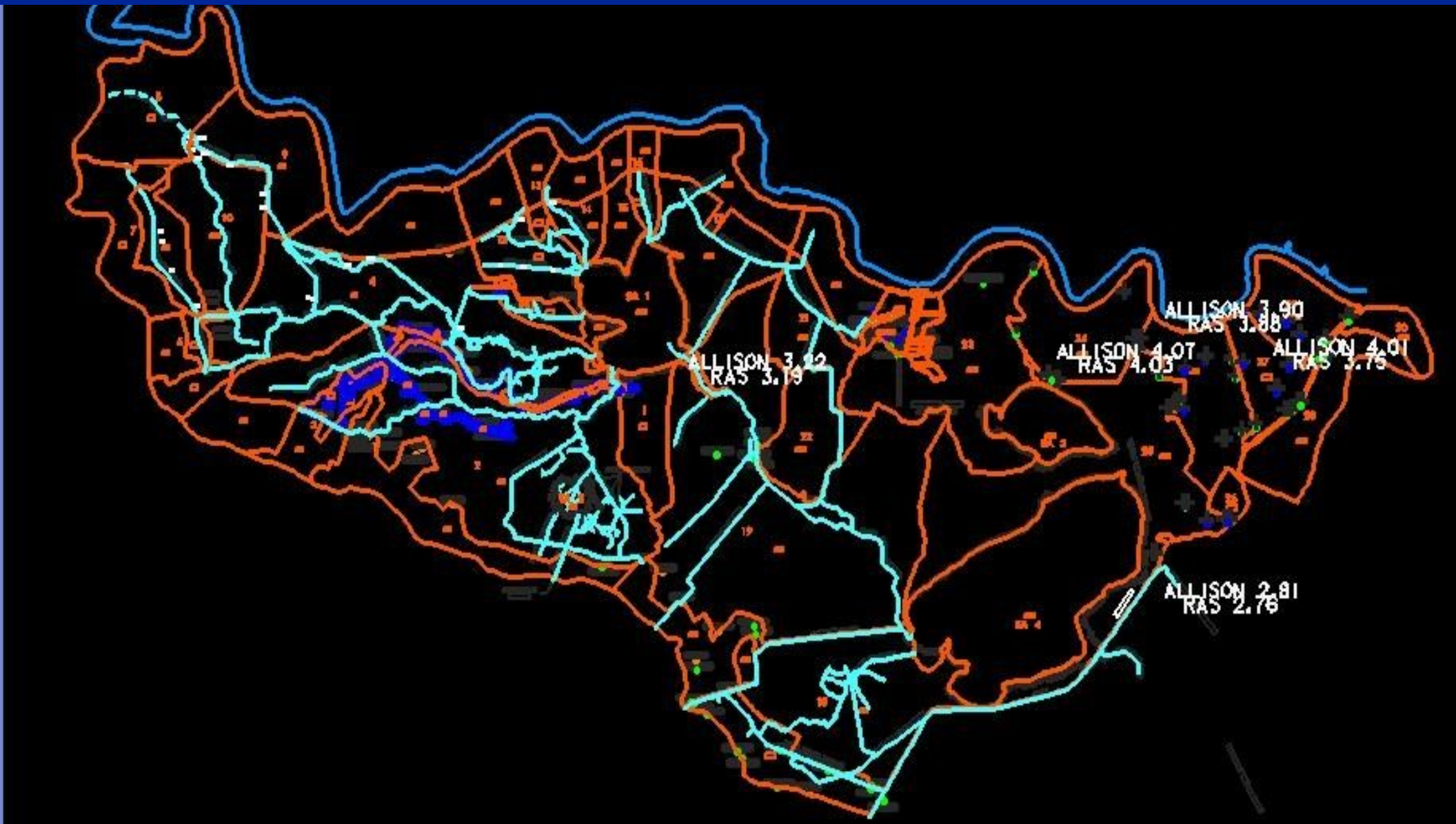
Donaldsonville, LA to the Gulf of Mexico



Donaldsonville, LA to the Gulf of Mexico

HEC – HMS Schematic

Bonifay, FL to the Gulf of Mexico



Donaldsonville, LA to the Gulf of Mexico

Sub-Watershed Areas

Subbasin		Drainage Area
Number	Description	Square Miles
1	Between Pipeline Canals	14.459
2	Raceland/Thibodaux, Bayou Boeuf/ Grand Bayou, SA2 Lake Boeuf	151.354
3	Elmer/Choupique/Chegby	14.616
	Bayou Boeuf @ Lac DesAllemands	165.970
4	Bayou Chevreuil/Bayou Citamon	101.997
5	Baker Canal South	8.461
6	Baker Canal East	0.590
7	Plattenville, Baker Canal North	30.767
8	Donaldsonville, Bayou Napoleon	34.978
9	Welcome, St. James Canal	24.782
10	Bayou Verret	28.689

Subbasin		Drainage Area
Number	Description	Square Miles
11	Lower Vacherie, Vacherie Canal	7.570
12	Vacherie, Bayou Lassene/Brazan Canal	24.579
13	Wallace	6.538
14	Bayou Becnel	11.892
15	Johnson	9.602
16	Edgard, Bayou Lasseigne	6.345
17	Killona, Bayou Fortier/ St. Charles Canal/ Providence Canal	45.500
SA1	Lake Des Allemands	24.571
19	Mathews/Raceland/Des Allemands, Godchaux Canal, Hwy 90	160.524

Donaldsonville, LA to the Gulf of Mexico

Subbasin		Drainage Area	Subbasin		Drainage Area
Number	Description	Square Miles	Number	Description	Square Miles
21	Hahnville, Eighty Arpent Canal, Paradis Canal	32.455	SA3	Lake Cataoutche	14.041
22	Sunset Drainage District	17.153	SA4	Lake Salvador	71.602
18	LaRose/Lockport, Tismond Foret Canal	71.823	24	Avondale/Waggaman	26.398
23	BayouVacherie, Company Canal Luling/Boutte, Cousins Canal, Davis	61.704	26	Near V-line levee	3.254
25	Pond Freshwater Diversion Project Marrero/Westwego, Bayou Segnette	107.901	27	Harvey/Gretna/Terrytown	13.688
			28	Belle Chase	20.830
			29	Algiers	15.035
			30	Stanton	6.094

Donaldsonville, LA to the Gulf of Mexico

Rainfall Depth – Duration Frequency

	HYD-35			TP=40					TP-49			
Frequency	5-min	15-min	1-hour	2-hour	3-hour	6-hour	12-hour	24-hour	2-day	4-day	7-day	10-day
1-YR												
2-YR	0.58	1.26	2.47	3.10	3.40	4.20	4.90	5.70	6.60	7.60	8.80	9.60
5-YR	0.65	1.44	3.01	3.75	4.30	5.30	6.50	7.70	8.50	9.50	11.00	12.00
10-YR	0.71	1.57	3.40	4.30	5.00	6.20	7.60	9.10	10.20	11.10	12.70	13.80
25-YR	0.79	1.76	3.97	5.00	5.70	7.20	9.00	10.60	12.10	13.30	15.30	16.70
50-YR	0.86	1.93	4.41	5.50	6.30	8.00	10.00	12.00	13.80	15.20	17.30	18.50
100-YR	0.93	2.07	4.85	6.10	6.90	9.00	11.10	13.20	15.10	17.00	19.10	20.50
200-YR	1.00	2.15	5.30	6.60	7.50	9.80	12.30	14.70	16.70	18.70	20.80	22.50
500-YR	1.05	2.30	5.80	7.30	8.40	10.90	13.70	16.70	18.70	20.90	23.20	25.00
1000-YR	1.10	2.50	6.20	7.90	9.00	11.80	14.80	18.00	20.20	22.50	25.00	27.00

Mexico

Habitat and Land Use Classification
Curve Numbers

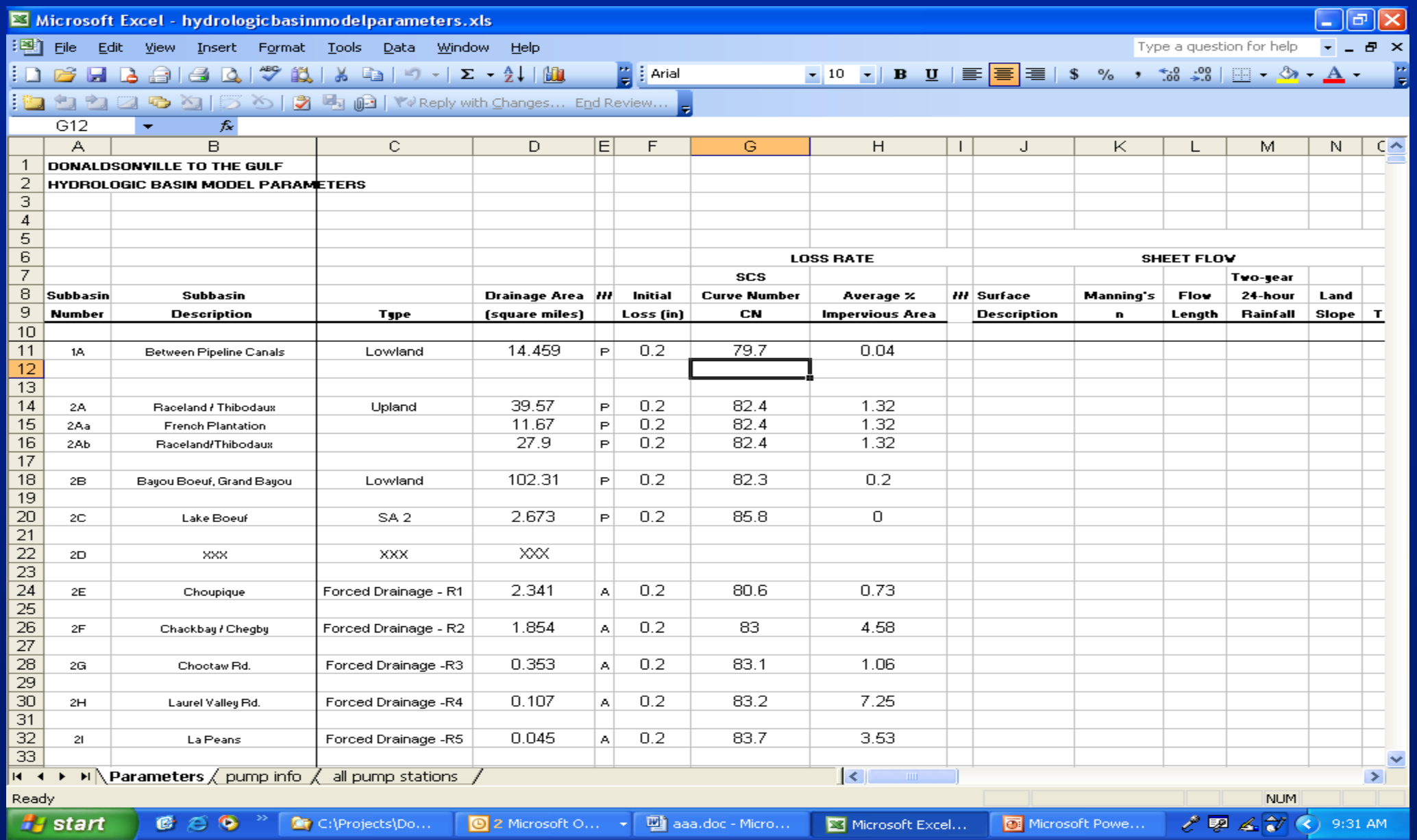
Classification	A	B	C#	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	D#
Fresh Marsh	39	61	74	74.6	75.2	75.8	76.4	77	77.6	78.2	78.8	79.4	80
Intermediate Marsh	39	61	74	74.6	75.2	75.8	76.4	77	77.6	78.2	78.8	79.4	80
Brackish Marsh	39	61	74	74.6	75.2	75.8	76.4	77	77.6	78.2	78.8	79.4	80
Saline Marsh	39	61	74	74.6	75.2	75.8	76.4	77	77.6	78.2	78.8	79.4	80
Wetland Forest-Dec	43	65	76	76.6	77.2	77.8	78.4	79	79.6	80.2	80.8	81.4	82
Wetland Forest-Ever	49	69	79	79.5	80	80.5	81	81.5	82	82.5	83	83.5	84
Wetland Forest-Mix	39	61	74	74.6	75.2	75.8	76.4	77	77.6	78.2	78.8	79.4	80
Upland Forest-Dec	32	58	72	72.7	73.4	74.1	74.8	75.5	76.2	76.9	77.6	78.3	79
Upland Forest-Ever	43	65	76	76.6	77.2	77.8	78.4	79	79.6	80.2	80.8	81.4	82
Upland Forest-Mix	39	61	74	74.6	75.2	75.8	76.4	77	77.6	78.2	78.8	79.4	80
Dense Pine Thicket	32	58	72	72.7	73.4	74.1	74.8	75.5	76.2	76.9	77.6	78.3	79
Wetland Scrub/Dec	30	48	65	65.8	66.6	67.4	68.2	69	69.8	70.6	71.4	72.2	73
Wetland Scrub/Ever	35	56	70	70.7	71.4	72.1	72.8	73.5	74.2	74.9	75.6	76.3	77

Mexico

Habitat and Land Use Classification Curve Numbers

Classification	A	B	C#	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	D#
Upland Scrub/Mix	30	55	68	68.7	69.4	70.1	70.8	71.5	72.2	72.9	73.6	74.3	75
Agri-Cropland-Grass	49	69	79	79.5	80	80.5	81	81.5	82	82.5	83	83.5	84
Vegetated Urban	49	69	79	79.5	80	80.5	81	81.5	82	82.5	83	83.5	84
Non-Vegetated Urban	71	80	87	87.4	87.8	88.2	88.6	89	89.4	89.8	90.2	90.6	91
Upland Barren	77	86	91	91.3	91.6	91.9	92.2	92.5	92.8	93.1	93.4	93.7	94
Wetland Barren	68	79	86	86.3	86.6	86.9	87.2	87.5	87.8	88.1	88.4	88.7	89
Wetland Complex	85	85	85	85	85	85	85	85	85	85	85	85	85
Water	100	100	100	100	100	100	100	100	100	100	100	100	100

Donaldsonville, LA to the Gulf of Mexico



Microsoft Excel - hydrologicbasinmodelparameters.xls

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Reply with Changes... End Review...

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DONALDSONVILLE TO THE GULF

HYDROLOGIC BASIN MODEL PARAMETERS

Subbasin Number	Subbasin Description	Type	Drainage Area (square miles)	###	Initial Loss (in)	LOSS RATE SCS Curve Number CN	LOSS RATE Average % Impervious Area	###	SHEET FLOW Surface Description	SHEET FLOW Manning's n	SHEET FLOW Flow Length	SHEET FLOW Two-year 24-hour Rainfall	SHEET FLOW Land Slope	T
1A	Between Pipeline Canals	Lowland	14.459	P	0.2	79.7	0.04							
2A	Raceland / Thibodaux	Upland	39.57	P	0.2	82.4	1.32							
2Aa	French Plantation		11.67	P	0.2	82.4	1.32							
2Ab	Raceland/Thibodaux		27.9	P	0.2	82.4	1.32							
2B	Bayou Boeuf, Grand Bayou	Lowland	102.31	P	0.2	82.3	0.2							
2C	Lake Boeuf	SA 2	2.673	P	0.2	85.8	0							
2D	XXX	XXX	XXX											
2E	Choupique	Forced Drainage - R1	2.341	A	0.2	80.6	0.73							
2F	Chackbay / Chegby	Forced Drainage - R2	1.854	A	0.2	83	4.58							
2G	Choctaw Rd.	Forced Drainage -R3	0.353	A	0.2	83.1	1.06							
2H	Laurel Valley Rd.	Forced Drainage -R4	0.107	A	0.2	83.2	7.25							
2I	La Peans	Forced Drainage -R5	0.045	A	0.2	83.7	3.53							

Parameters / pump info / all pump stations

Ready NUM

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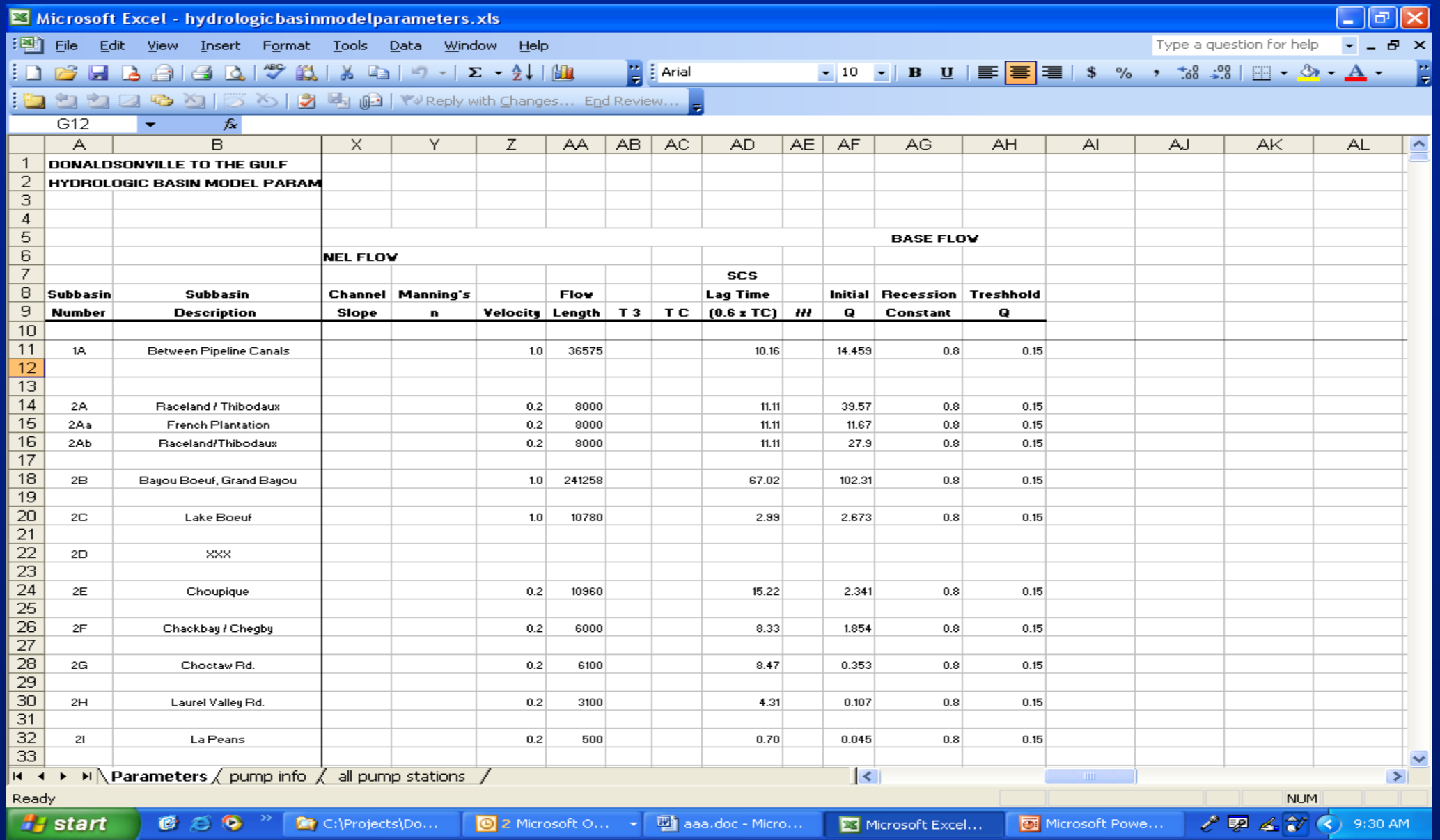
Donaldsonville, LA to the Gulf of Mexico


Microsoft Excel - hydrologicbasinmodelparameters.xls
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Type a question for help
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Reply with Changes... End Review...
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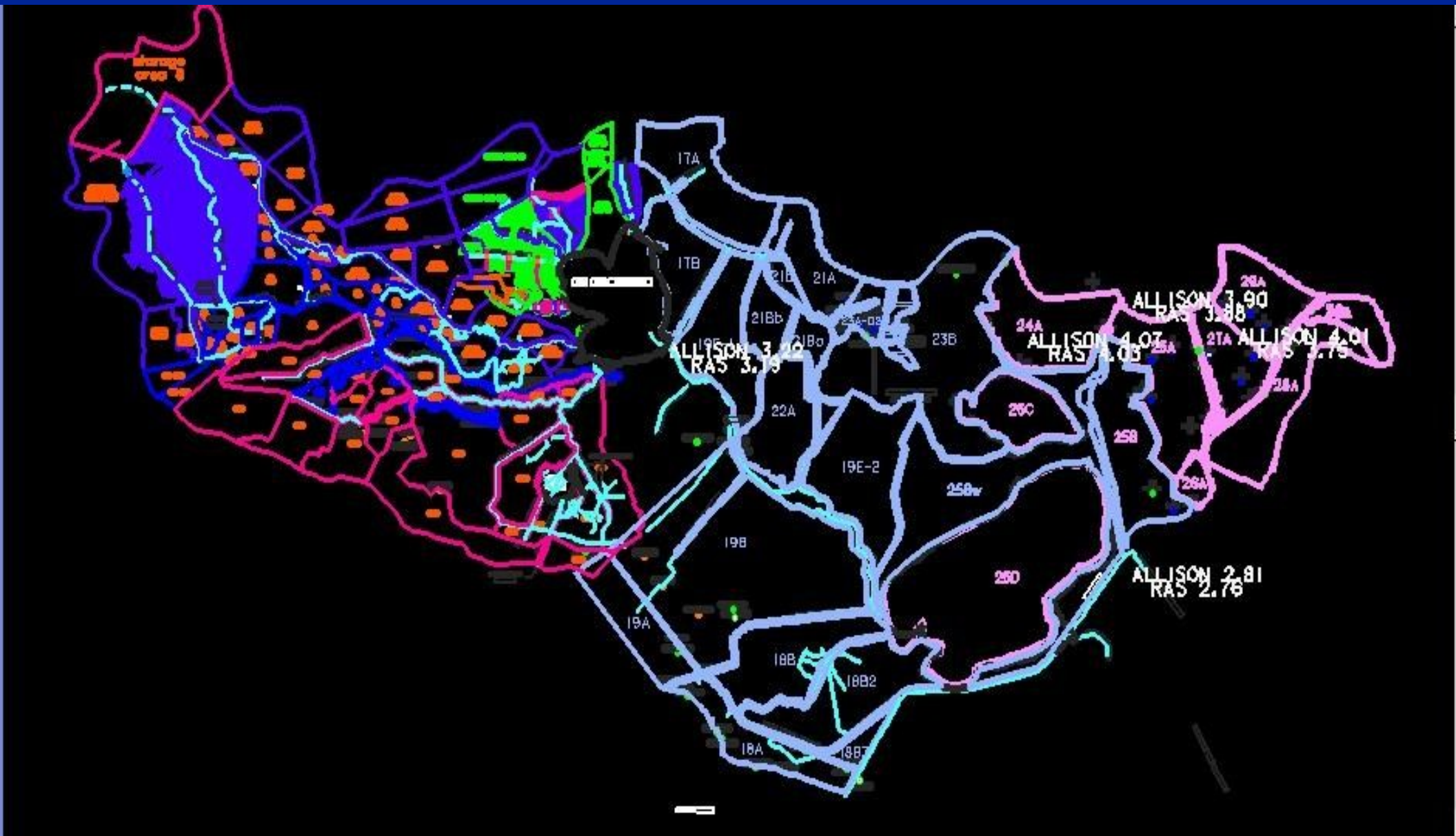
	A	B	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL
1	DONALDSONVILLE TO THE GULF																
2	HYDROLOGIC BASIN MODEL PARAM																
3																	
4																	
5												BASE FLOW					
6			NEL FLOW														
7									SCS								
8	Subbasin	Subbasin	Channel	Manning's		Flow			Lag Time		Initial	Recession	Treshhold				
9	Number	Description	Slope	n	Velocity	Length	T 3	T C	(0.6 x TC)	##	Q	Constant	Q				
10																	
11	1A	Between Pipeline Canals			1.0	36575			10.16		14.459	0.8	0.15				
12																	
13																	
14	2A	Raceland / Thibodaux			0.2	8000			11.11		39.57	0.8	0.15				
15	2Aa	French Plantation			0.2	8000			11.11		11.67	0.8	0.15				
16	2Ab	Raceland/Thibodaux			0.2	8000			11.11		27.9	0.8	0.15				
17																	
18	2B	Bayou Boeuf, Grand Bayou			1.0	241258			67.02		102.31	0.8	0.15				
19																	
20	2C	Lake Boeuf			1.0	10780			2.99		2.673	0.8	0.15				
21																	
22	2D	XXX															
23																	
24	2E	Choupique			0.2	10960			15.22		2.341	0.8	0.15				
25																	
26	2F	Chackbay / Chegby			0.2	6000			8.33		1.854	0.8	0.15				
27																	
28	2G	Choctaw Rd.			0.2	6100			8.47		0.353	0.8	0.15				
29																	
30	2H	Laurel Valley Rd.			0.2	3100			4.31		0.107	0.8	0.15				
31																	
32	2I	La Peans			0.2	500			0.70		0.045	0.8	0.15				
33																	

Donaldsonville, LA to the Gulf of Mexico

HEC – RAS Drainage Areas

Bondurant, IA to the Gulf of Mexico



Mexico

BAYOUS & CANALS SURVEYS

BAKER CANAL EAST	COMPANY CANAL
BAKER CANAL NORTH	COMPANY CANAL NORTH
BAKER CANAL SOUTH	EIGHTY ARPENT CANAL
BAYOU BARATARIA	FORTY ARPENT CANAL
BAYOU BECNEL	GIWW
BAYOU BOEUF	GODCHAUX CANAL
BAYOU CHEVREUIL	GRAND BAYOU
BAYOU CITAMON	HALPIN CANAL
BAYOU DES ALLEMANDS	LAC DES ALLEMANDS
BAYOU FORTIER	OLD & NEW U.S. HWY 90
BAYOU LASSEIGNE	PARADIS CANAL
BAYOU LASSENE	PIPELINE CANAL
BAYOU PEROT	PIPELINE LOCATION CANALS / Monterey & Bowie Canals
BAYOU VACHERIE	
BAYOU VERRET	PROVIDENCE CANAL
BAYOU SEC / Bayou Verret South	RL1 – CHOUPIQUE
BRAZAN CANAL	RL2 – CHACKBAY, CHEGBY

Mexico

BAYOUS & CANALS SURVEYS CONTINUATION

RL3 – CHOCTEAU RD.	THERIOT CANAL
RL4 – LAUREL VALLEY RD.	TISAMOND FORET CANAL
RL5 – LA PEANS	VACHERIE CANAL
RL6 – BAYOU BATON PILOU	BAYOU DES ALLEMANDS STRUCTURE
RL7 – KRAEMER	LAKE BOEUF
RL8 – BAYOU ROND POMPON	LAKE CATAOUATCHE
RL9 – BOEUF	LAKE SALVADOR
RL10 – BAYOU BOEUF	BAYOU PEROT
RL11 – LOWER VACHERIE	GIWW
SAM FORET CANAL	BAYOU SEGNETTE WATERWAY
ST. CHARLES CANAL	BAYOU BARATARIA WATERWAY
ST. JAMES CANAL EAST	ALGIERS CANAL
ST. JAMES CANAL SOUTH	HARVEY CANAL
ST. JAMES CANAL NORTH	

Donaldsonville, LA to the Gulf of Mexico

Tropical Storm Allison Calibration

Donaldsonville, LA to the Gulf of Mexico

COMPARISON OF TROPICAL STORM ALLISON* HISTORICAL STAGES VS. HEC-RAS COMPUTED STAGES FOR SELECTED GAGE LOCATIONS (FT. NGVD)

GAGE LOCATION	ALLISON STAGE	HEC-RAS STAGE
Barataria Waterway @ Lafitte, LA	2.81	2.76
Bayou Des Allemands @ Des Allemands, LA	3.22	3.19
Bayou Segnette @ Lapalco Blvd., LA	4.07	4.03
Intracoastal Waterway @ Harvey Lock, LA	3.90	3.88
* Tropical Storm Allison 4 to 12 June, 2001.		
Intracoastal Waterway @ Algiers Lock, LA	4.01	3.75

Donaldsonville, LA to the Gulf of Mexico

Hurricane Surge

- ADCIRC Modeling
- Hurricane Surge Model of Existing Conditions
  - Identify Hurricane Surge Heights
  - Water Level Boundary Conditions for Interior Drainage
- Analyze Future Conditions

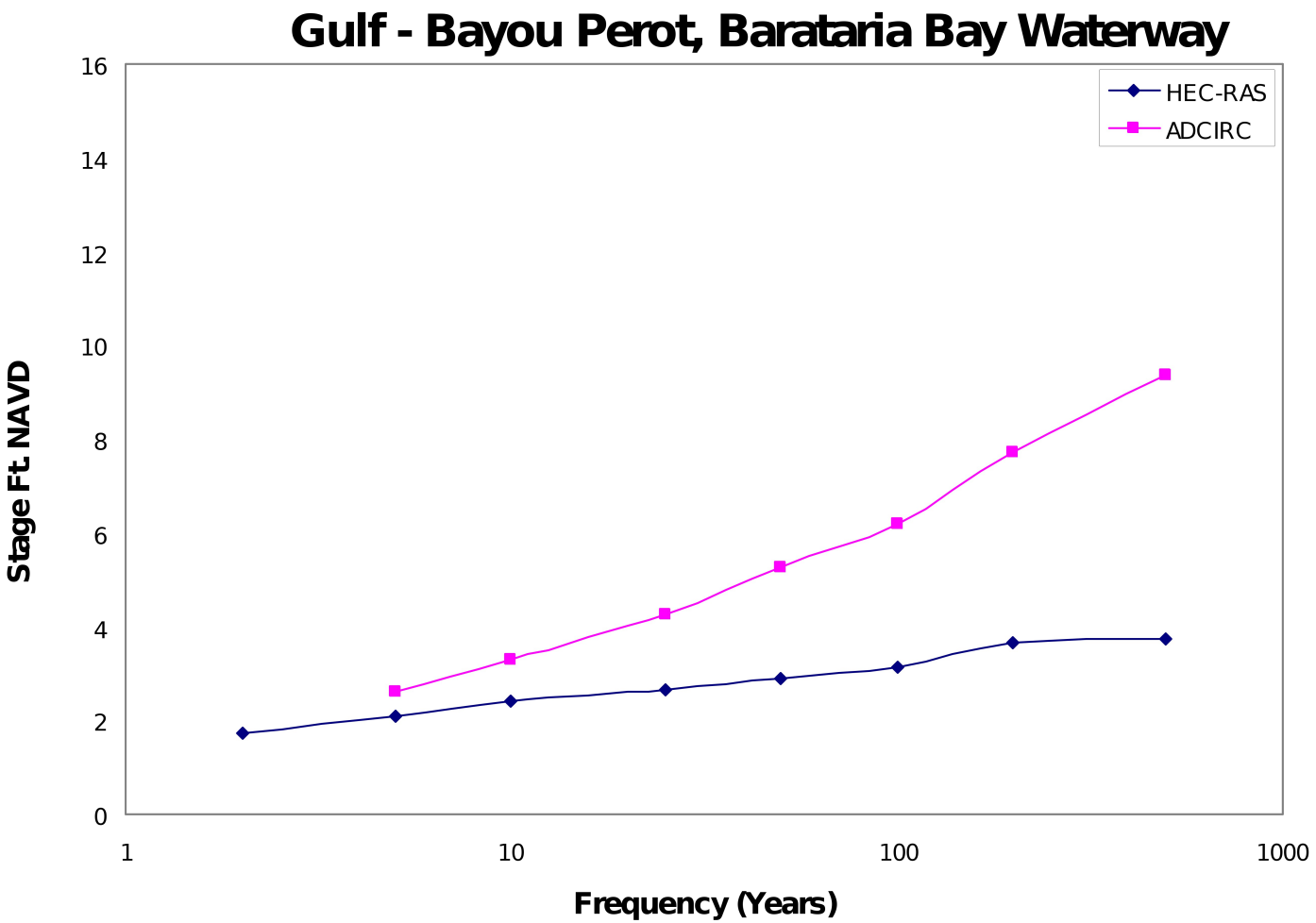
Donaldsonville, LA to the Gulf of Mexico

ADCIRC Modeling

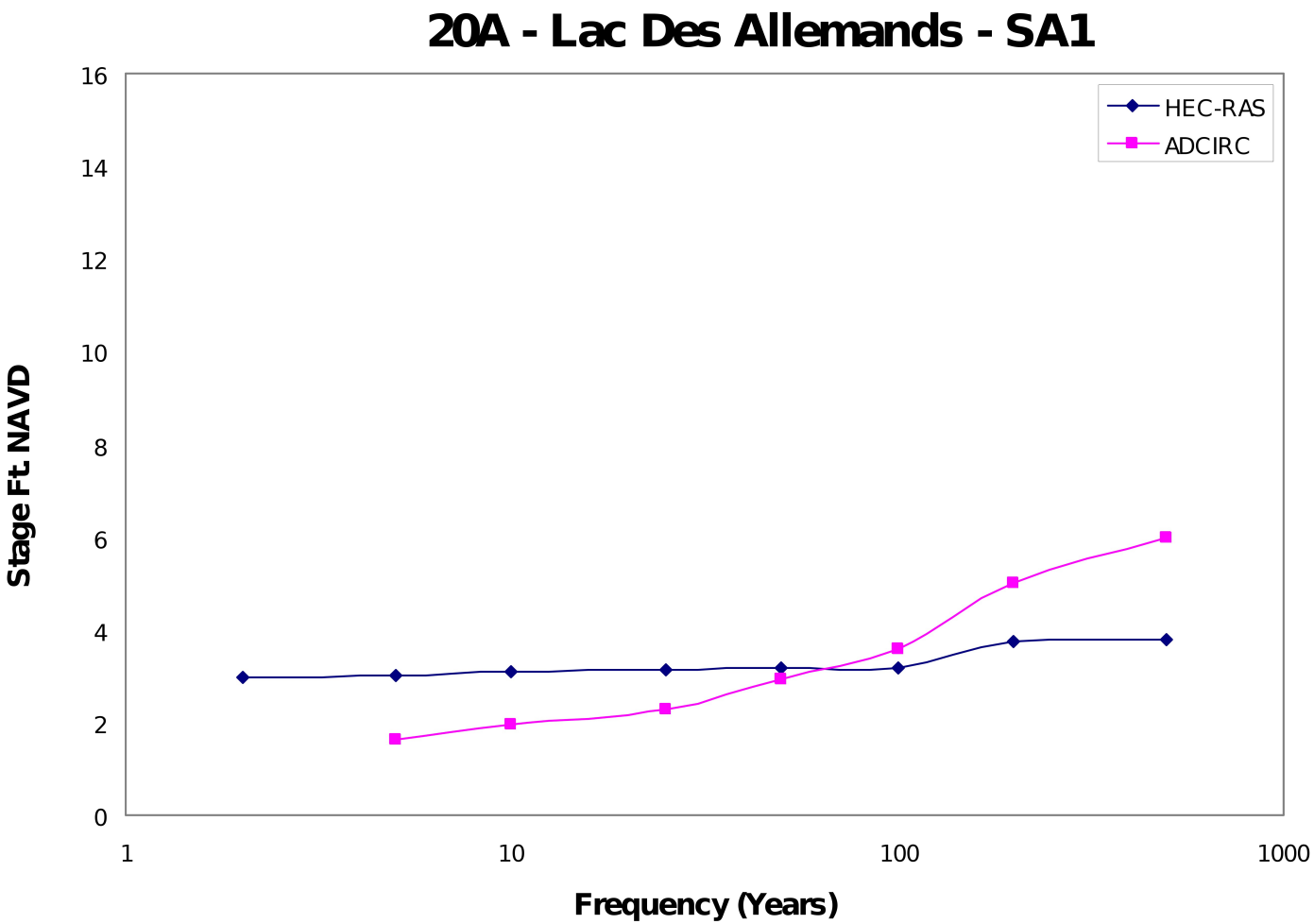
Donaldsonville, LA to the Gulf of Mexico

Typical Existing Conditions
Stage – Frequency Curves
HEC – RAC and ADCIRC

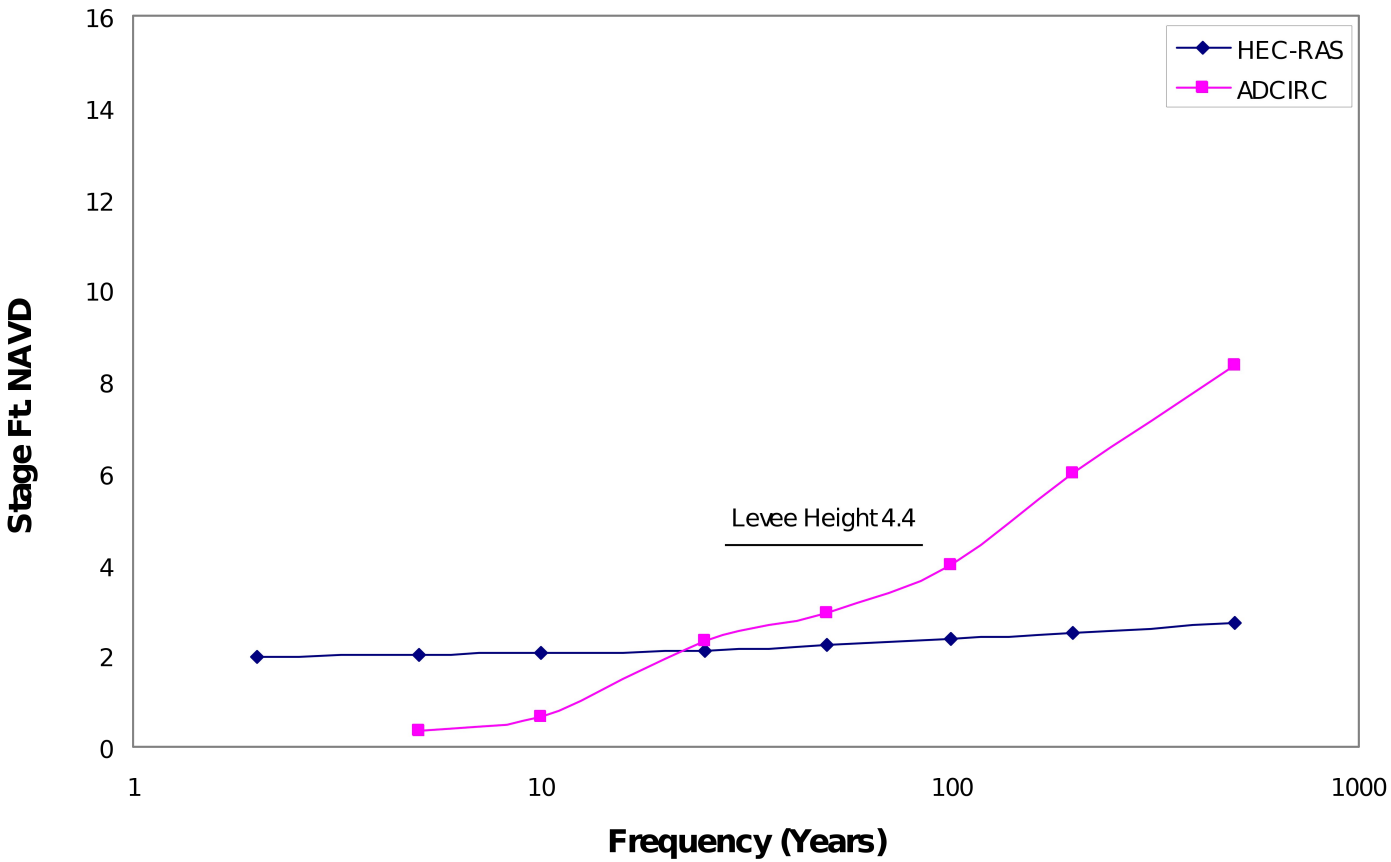
Mexico


Gulf - Bayou Perot, Barataria Bay Waterway
HEC-RAS
ADCIRC
Stage Ft NAVD
0
2
4
6
8
10
12
14
16
1
10
100
1000
Frequency (Years)

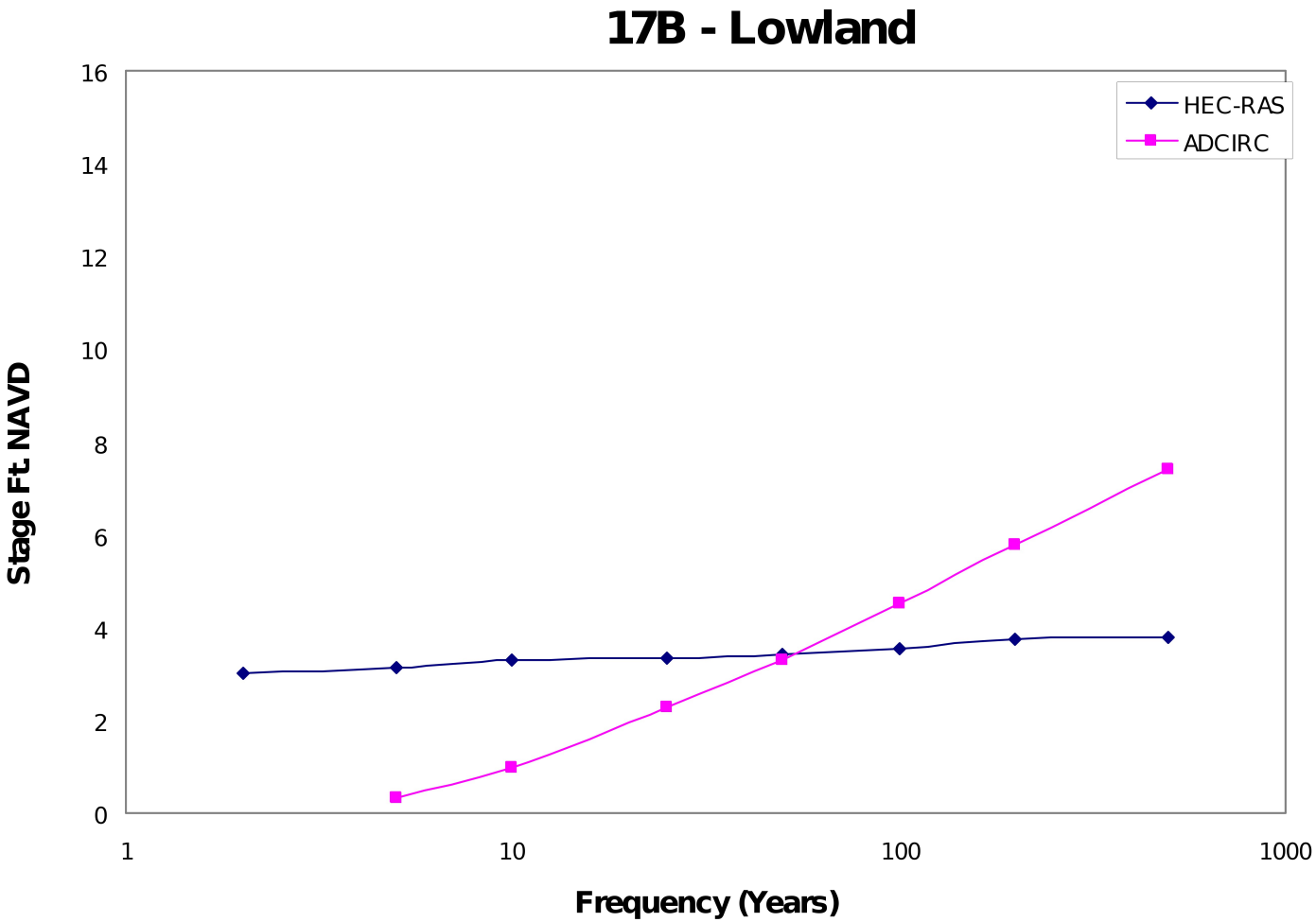
Mexico


20A - Lac Des Allemands - SA1
HEC-RAS
ADCIRC
Stage Ft. NAVD
Frequency (Years)
0
2
4
6
8
10
12
14
16
1
10
100
1000

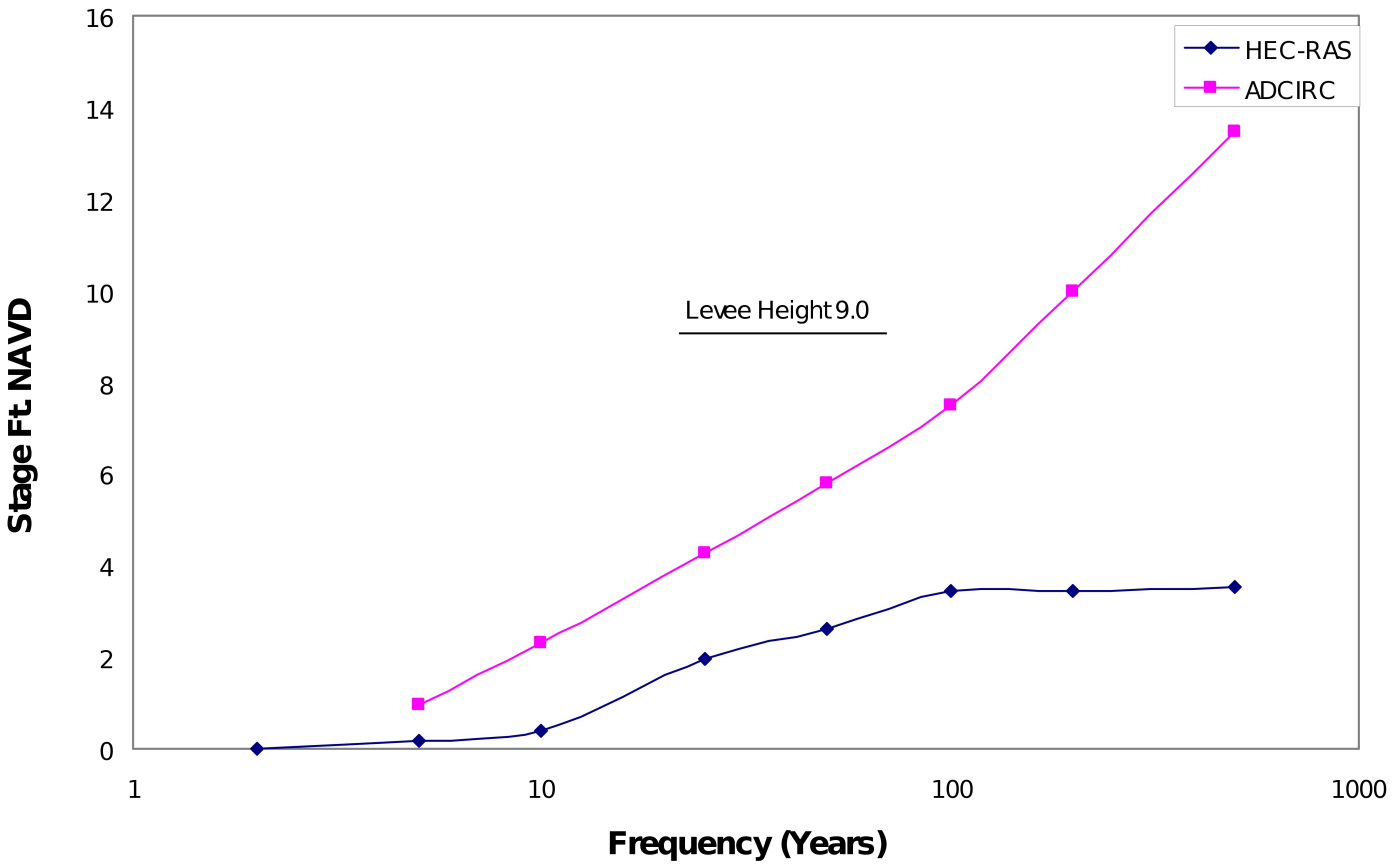
Mexico


2L - Forced Drainage RL8
HEC-RAS
ADCIRC
Levee Height 4.4
Stage Ft. NAVD
Frequency (Years)
0
2
4
6
8
10
12
14
16
1
10
100
1000

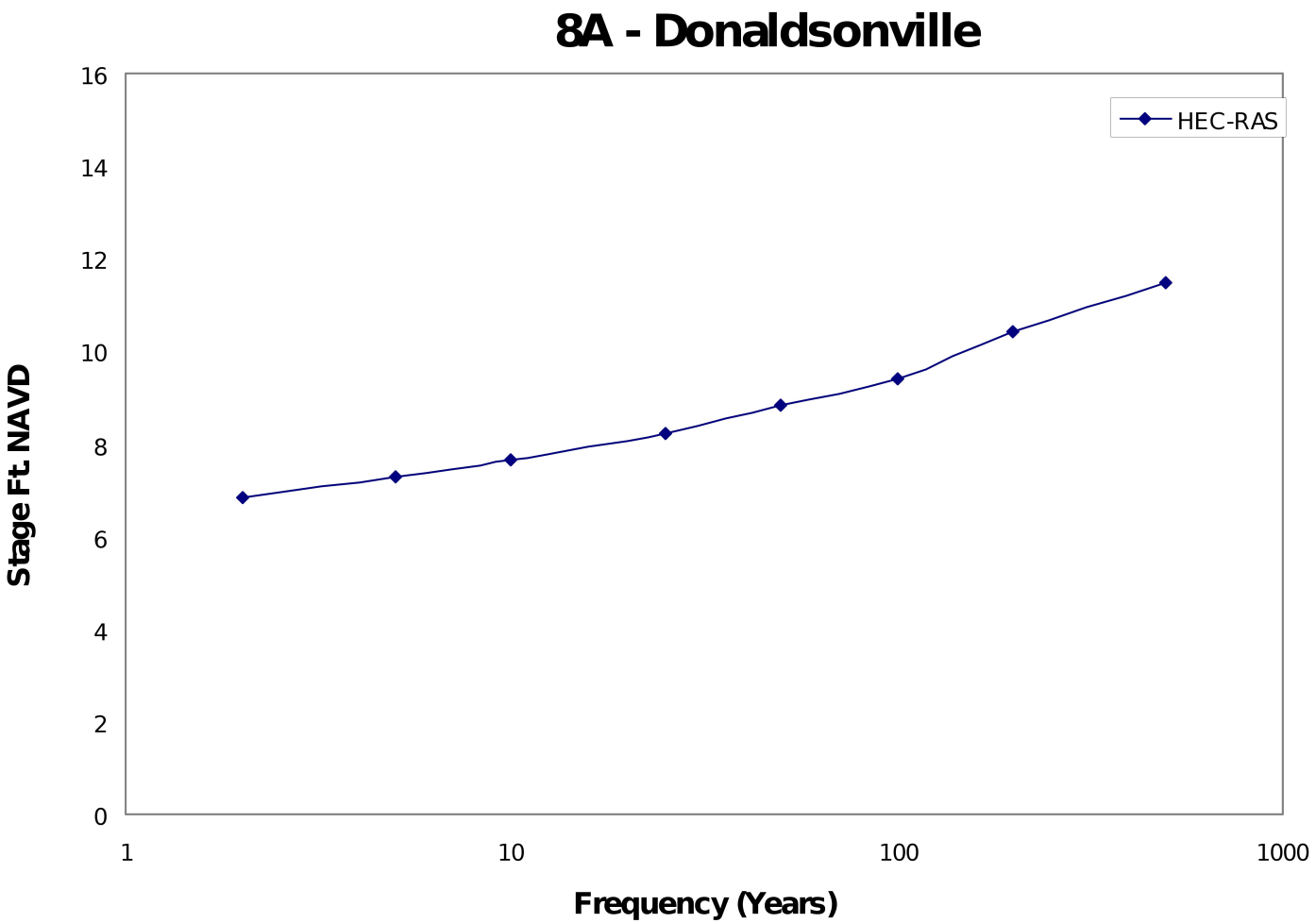
Mexico


17B - Lowland
HEC-RAS
ADCIRC
Stage Ft. NAVD
Frequency (Years)
0
2
4
6
8
10
12
14
16
1
10
100
1000

Mexico


25A - Marrero/Westwego
HEC-RAS
ADCIRC
Levee Height 9.0
Stage Ft. NAVD
Frequency (Years)
0
2
4
6
8
10
12
14
16
1
10
100
1000

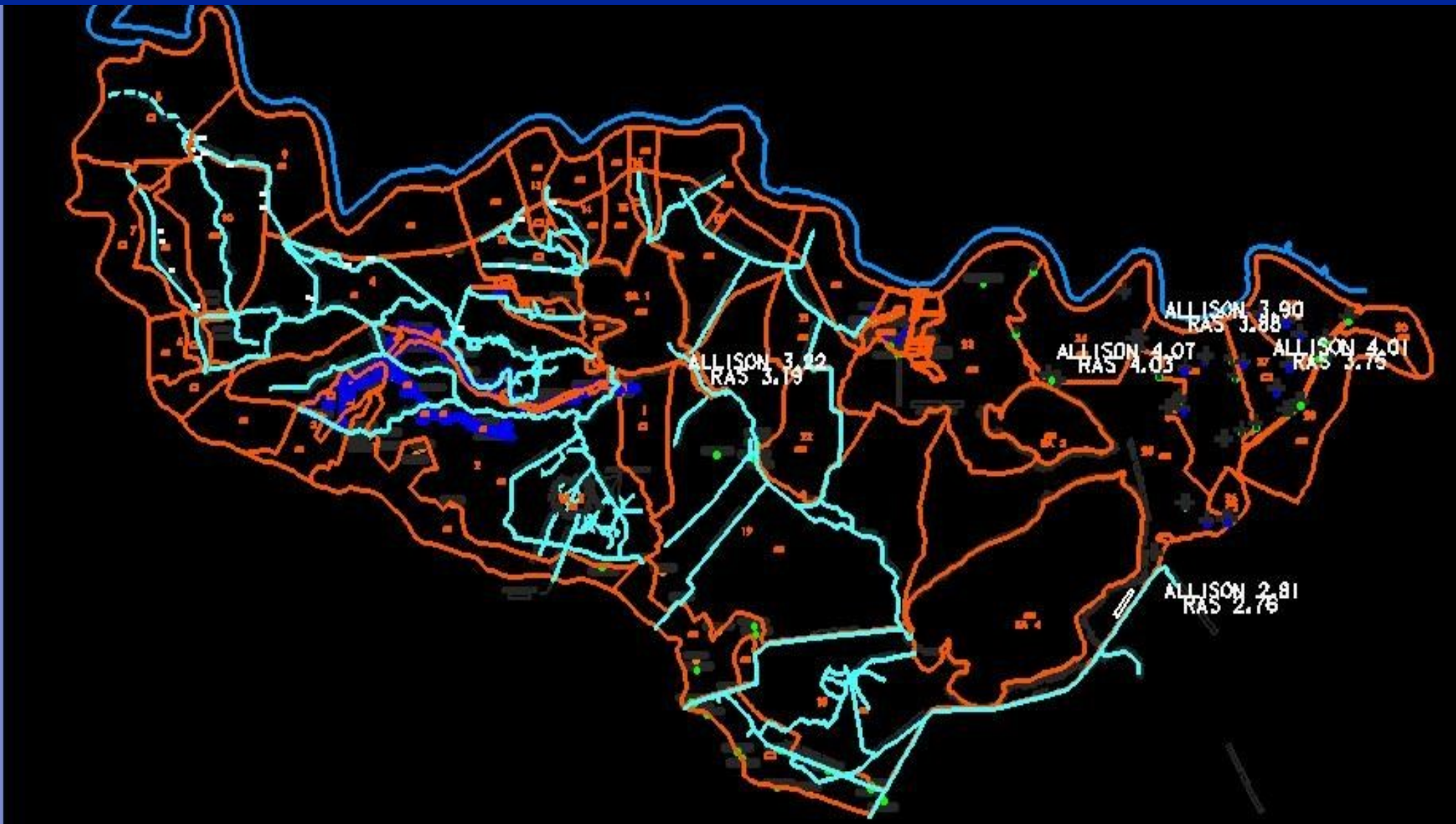
Donaldsonville, LA to the Gulf of Mexico



Donaldsonville, LA to the Gulf of Mexico

Reach and Stage Data for Economic Analysis

Bonifay, FL to the Gulf of Mexico



Mexico

Location = Between Pipeline Canals Storage area = SA-1A Reach = 1A Type = Lowland
Land Use = Wetland Forest – Deciduous & Fresh Marsh

Frequency (years)	Existing Conditions Stage (ft NAVD)	Existing		Alternatives Stage (ft NAVD)					
		RAS	ADCIRC						
1	X				X	X	X	X	X
2	2.5	2.5							
5	2.93	2.93	1.64						
10	3.22	3.22	1.97						
25	3.56	3.56	2.62						
50	3.77	3.77	3.28						
100	4.1	3.95	4.1						
200		4.09							
500	6.82	4.29	6.82						

Mexico

Location = Bayou Perot, Barataria Waterway Storage Area = Gulf Stream = GIWW Type = I
Land Use = Fresh Marsh& Wetlands; Forest – Deciduos & Water

Frequency (years)	Existing Conditions Stage (ft NAVD)	Existing		Alternatives Stage (ft NAVD)					
		RAS	ADCIRC						
1	X				X	X	X	X	X
2	1.74	1.74							
5	2.62	2.09	2.62						
10	3.28	2.4	3.28						
25	4.27	2.64	4.27						
50	5.25	2.91	5.25						
100	6.2	3.14	6.2						
200	7.7	3.64	7.7						
500	9.35	3.73	9.35						

Donaldsonville, LA to the Gulf of Mexico

Future Activities

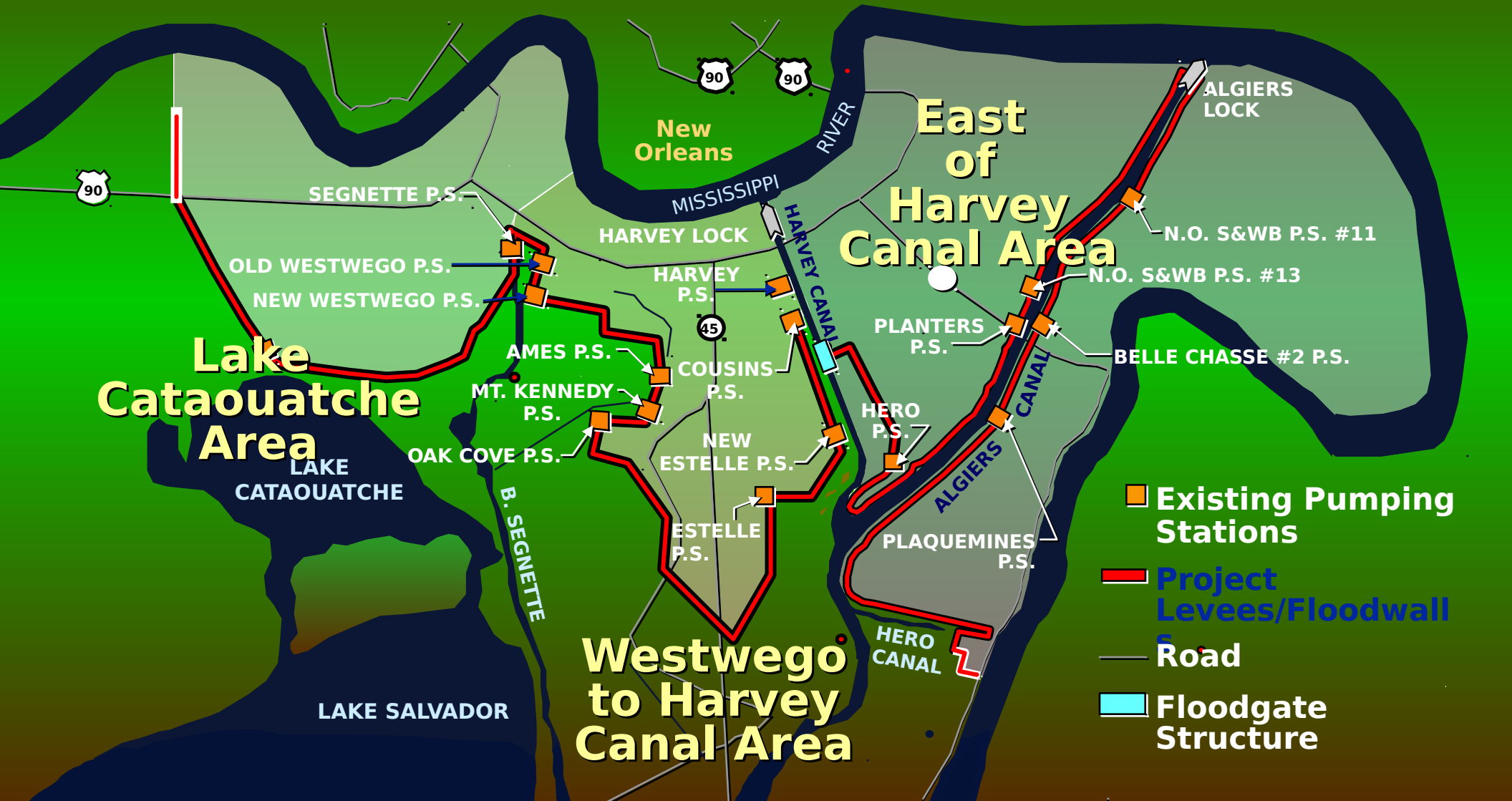
Donaldsonville, LA to the Gulf of Mexico

Levee Alternatives
Current Levee Alignments Being Studied

Donaldsonville, LA to the Gulf of Mexico
Possible Hurricane Levee Alignments
Donaldsonville
Mississippi
Laplace
St. John Parish
St. James Parish
Lac Des Allemands
River
Luling
Metairie
West Bank HP Project
Jefferson Parish
Lake Cataouatche
Des Allemands
Thibodaux
Lafourcha Parish
Hwy. 90
St. Charles Parish
Bayou Lafourche
Pipeline Canal
Lake Salvador
Terrebonne Parish
Houma
GIWW
Larose
- Bayou Lafourche
- Hwy 90
- Pipeline Canal
- GIWW
- West Bank & Vicinity Hurricane Protection

Donaldsonville, LA to the Gulf of Mexico
Modified GIWW Hurricane Levee Alignment
Donaldsonville
Mississippi
Laplace
St. John Parish
St. James Parish
Lac Des Allemands
River
Metairie
West Bank HP Project
Luling
Jefferson Parish
Lake Cataouatche
Thibodaux
Lafourche Parish
St. Charles Parish
Bayou Lafourche
Lake Salvador
H
H
Terrebonne Parish
Houma
GIWW
GIWW
GIWW
Larose

West Bank & Vicinity, New Orleans, LA, Hurricane Protection Project



Donaldsonville, LA to the Gulf of Mexico

Water and Sediment Diversion Structures

Donaldsonville, LA to the Gulf of Mexico
Water & Sediment Diversion Structures
Donaldsonville
Mississippi
Laplace
St. John Parish
St. James Parish
Lac Des Allemands
River
Metairie
Luling
Jefferson Parish
Lake Cataouatche
Third Delta Conveyance Channel
Water Diversion Structures
Des Allemands
Thibodaux
St. Charles Parish
Bayou
Lafourche
Lake Salvador
Channel Cross-Section
1500’
30’ – 60’
Houma
Lafourche Parish
Larose
GIWW
Terrebonne Parish

Donaldsonville, LA to the Gulf of Mexico

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Study Website:
http://www.mvn.usace.army.mil/pd/projectsList/
Below the List of Projects
click on “Mississippi River & Tributaries (MRT)”
click on “Donaldsonville to the Gulf of Mexico”